Armed Forces College of Medicine

AFCM

The Hand

INTENDED LEARNING OBJECTIVES (ILO)

1. Define attachments, structures passing superficial and deep to flexor & extensor retinaculum
2. Identify fibrous flexor sheaths
3. List the attachments and function of palmar aponeurosis
4. Enumerate contents of facial compartments of palm
5. Enumerate boundaries, floor and contents of anatomical snuff box
6. Identify muscles of the hand & their nerve supply

THE HAND

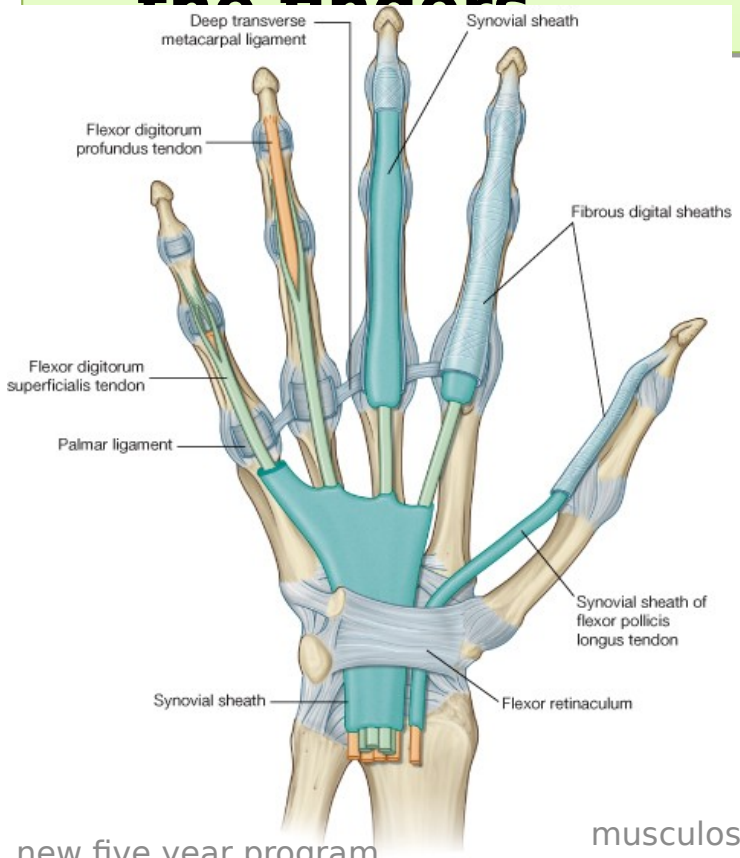
palm of the hand

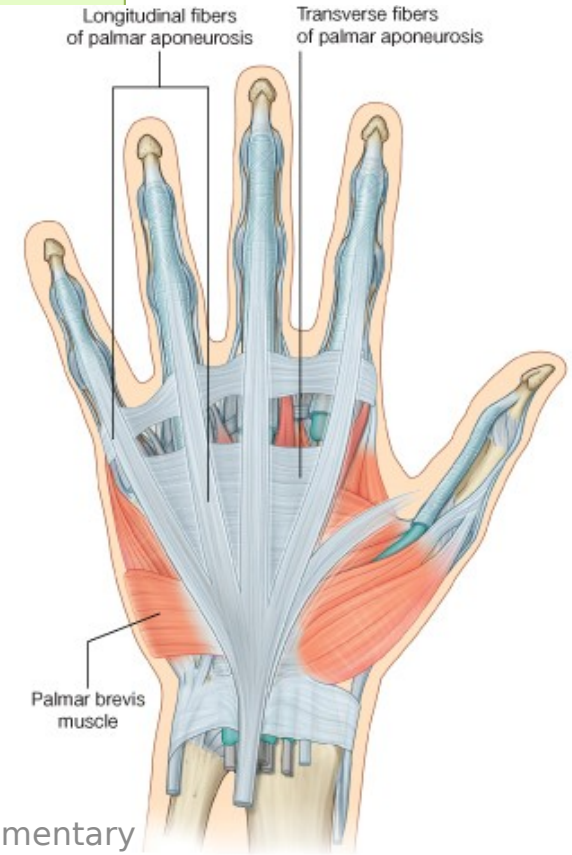
dorsum of the hand

https://en.wikipedia.org/wiki/Hand

Deep fascia of palm of the hand

1. **Palmar aponeurosis**
2. **Flexor retinaculum**
3. **Fibrous flexor sheath of the fingers**

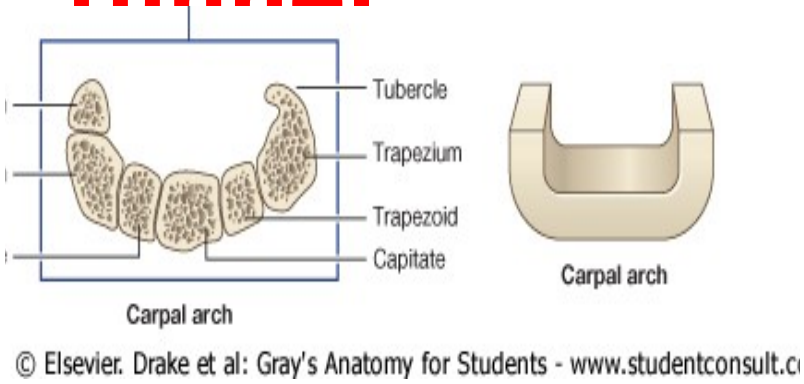




exor Retinaculum of Wrist

**Definition:

It is a thickened strong fibrous band of deep fascia which crosses in front of the carpus and converts its anterior concavity into the **carpal tunnel**



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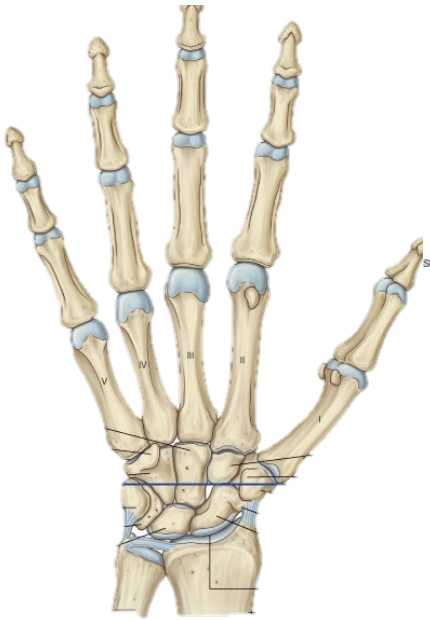

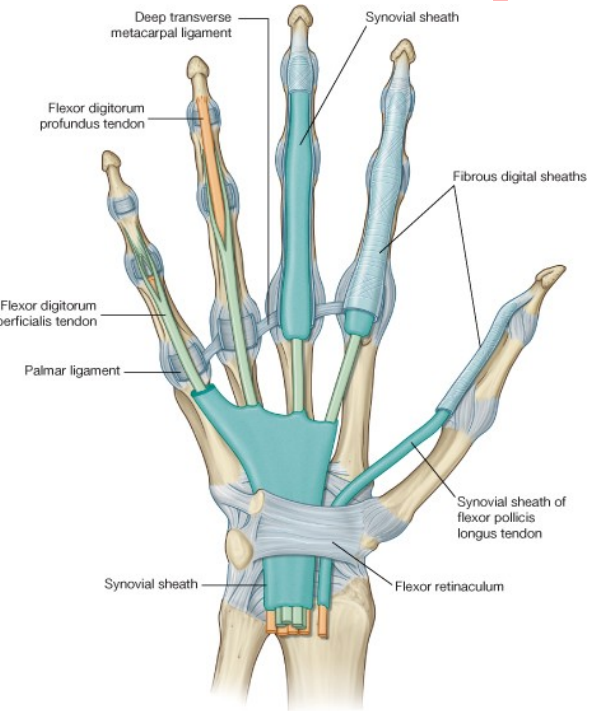

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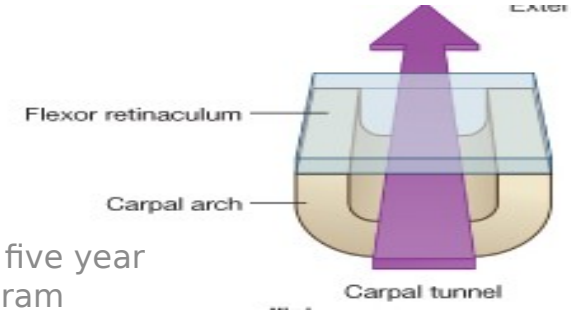


exor Retinaculum of Wrist

- **Function : prevents displacement of long flexor tendons during contraction**

It is attached to the

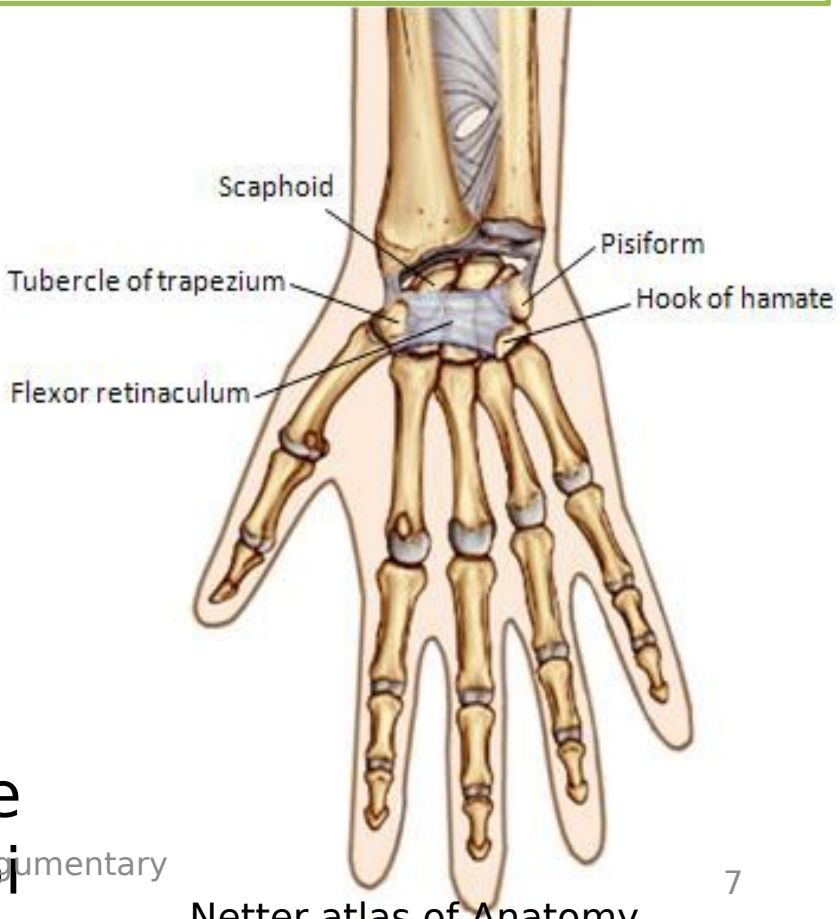
1.Medially:

- pisiform
- hook of hamate.

2. Laterally:

- scaphoid
- Trapezium

It splits into 2 laminae; a superficial one & a deep one for the tendon of flexor carpi radialis



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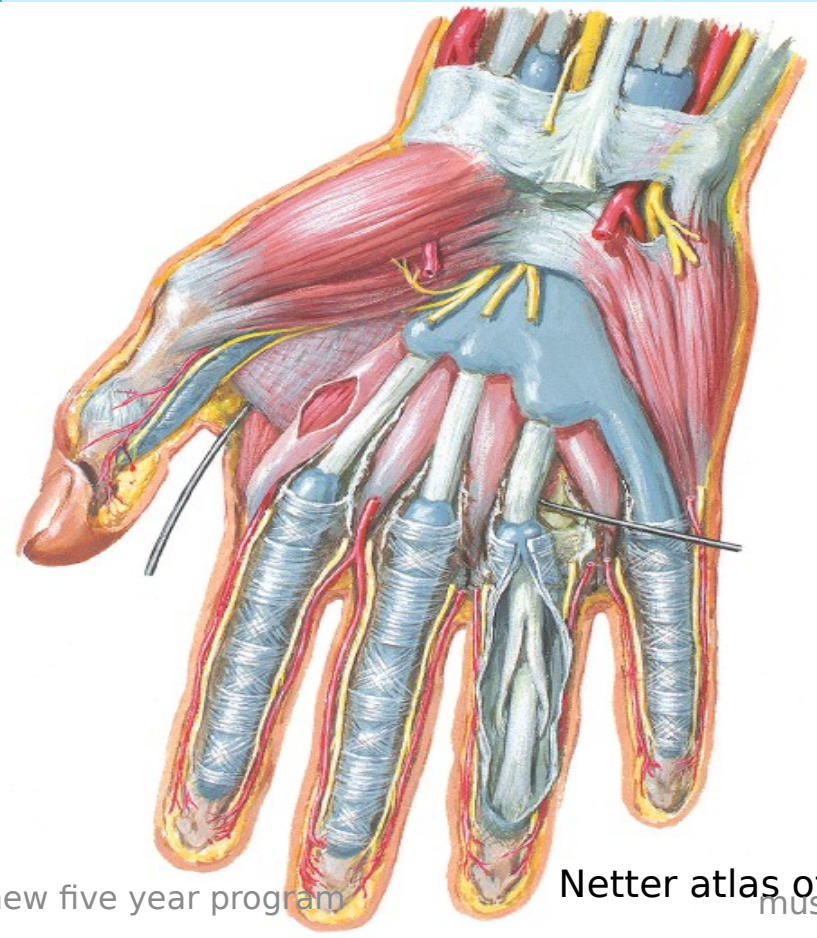
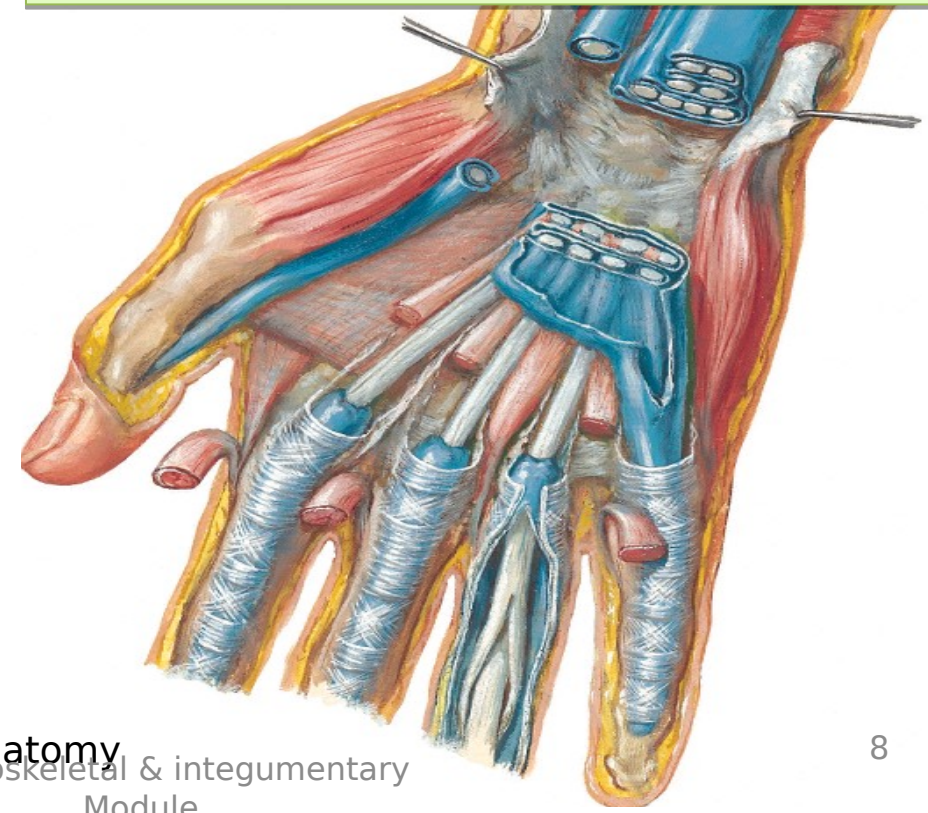
exor Retinaculum of Wrist

Structures passing
DEEP



Structures passing
SUPERFICIAL
(arranged from medial to lateral)



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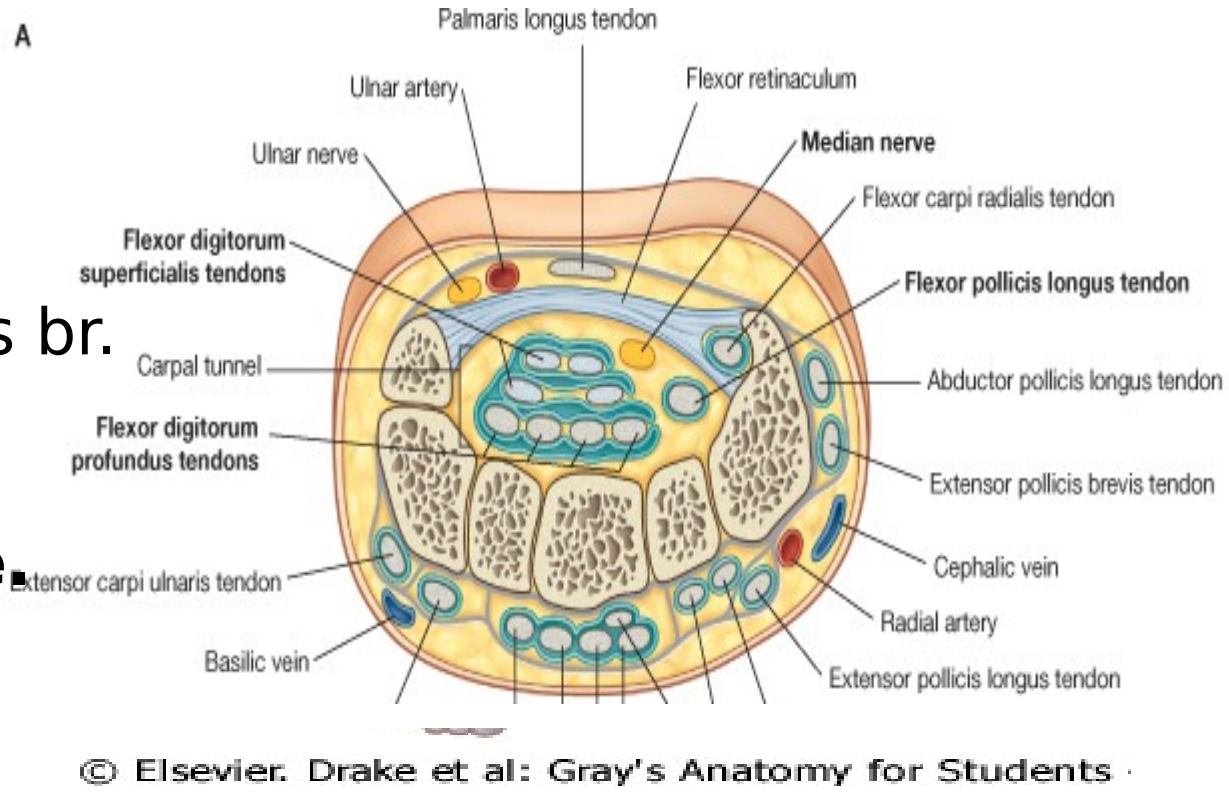
exor Retinaculum of Wrist

Structures passing SUPERFICIAL (arranged from medial to lateral)

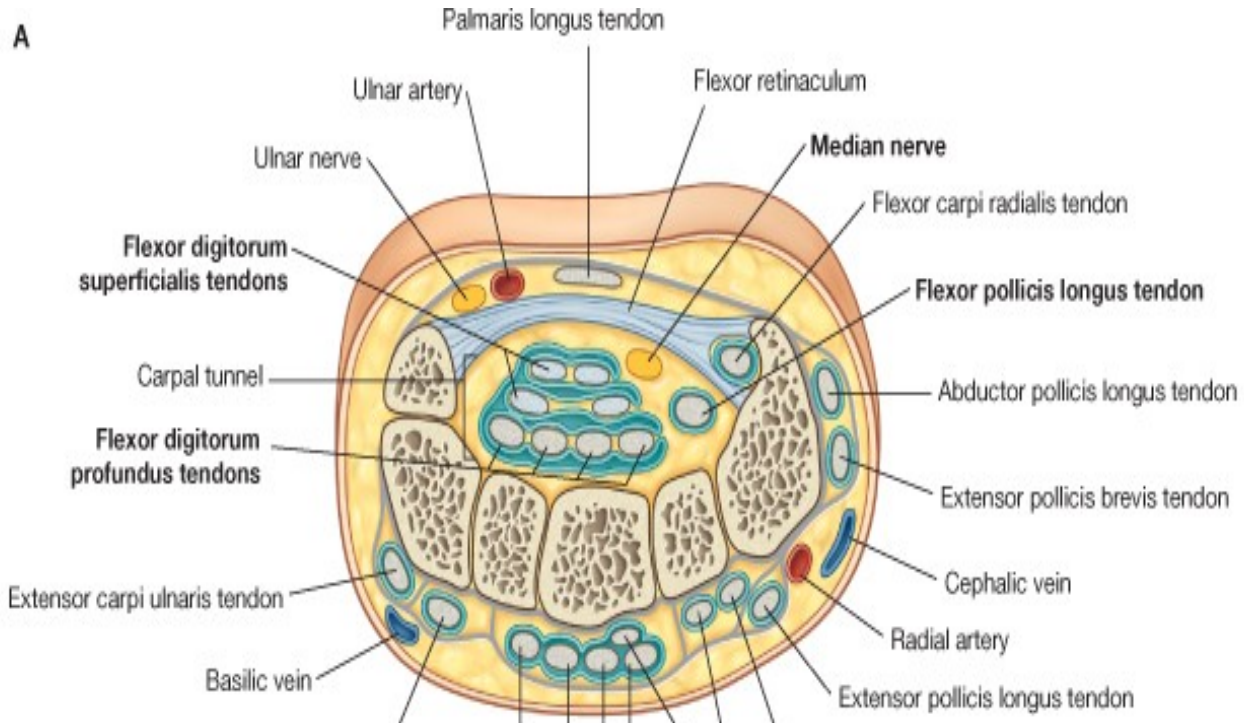
- **Tendon of Palmaris Longus**
- **Ulnar nerve.**
- **Ulnar vessels**.
- Palmar cutaneous br. of
  - ✓ **ulnar nerve**.
  - ✓ **median nerve.**



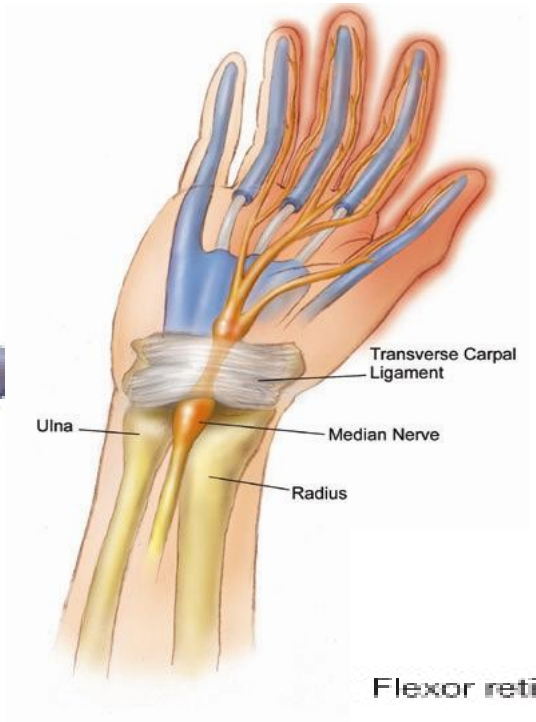
exor Retinaculum of Wrist

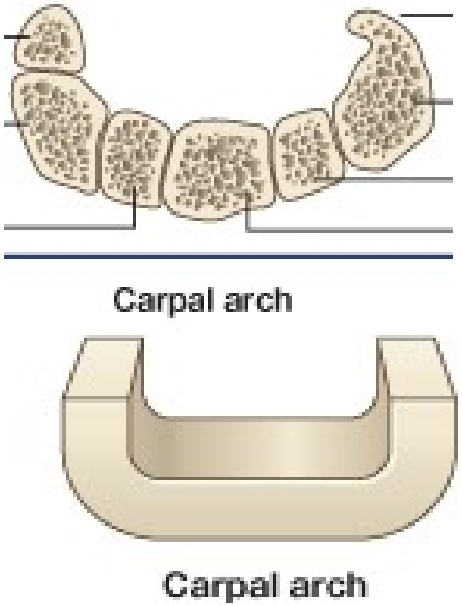
Structures passing DEEP *(in the carpal tunnel)*

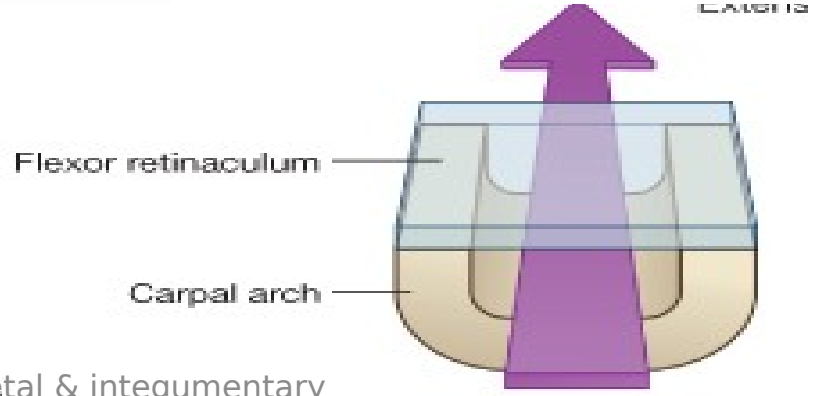
- **Median nerve**
- **Tendons of**
  - **fl. digit. superficialis.**
  - **fl. digit. profundus.**
  - **flexor pollicis longus**
  - **flexor carpi radialis**
- Common



inical Anatomy-
What is carpal tunnel syndrome?

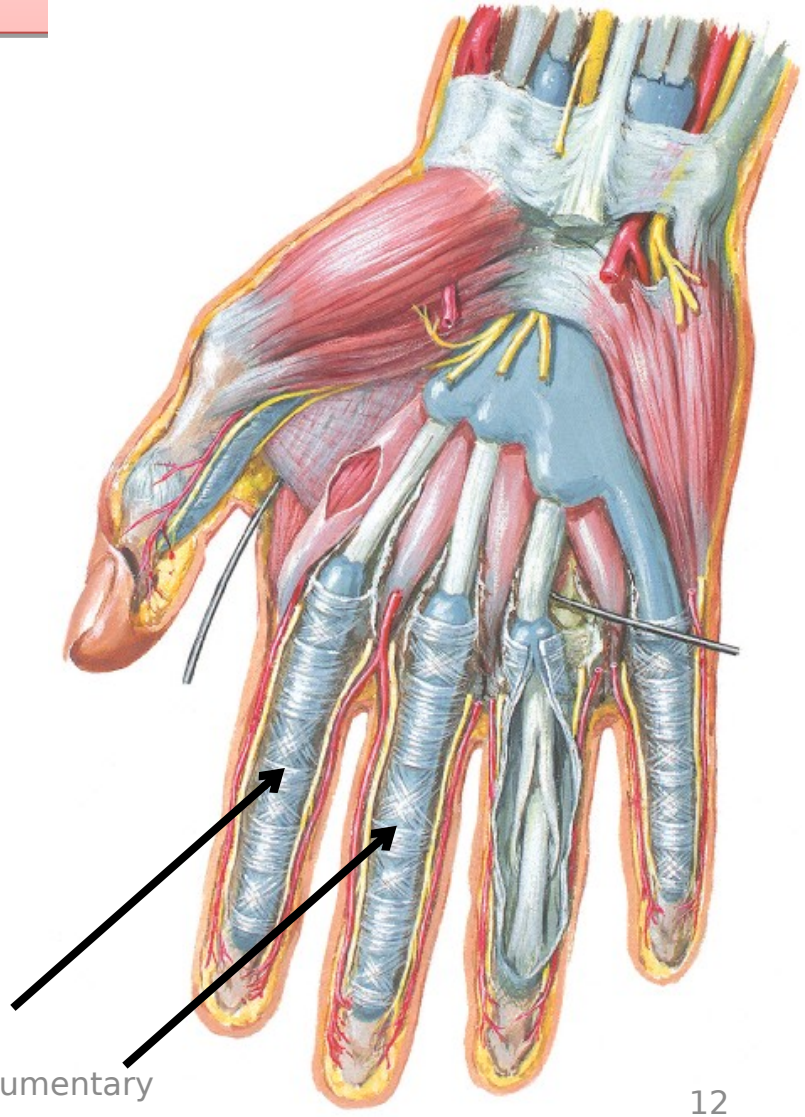






Fibrous flexor sheaths

- These are dense plates of **fibrous tissue** which arch across the **flexor tendons in the fingers**.
- **Function:**
  - Each forms with the phalanges **a tunnel** which is lined by a synovial sheath lubricating the movement of the tendon



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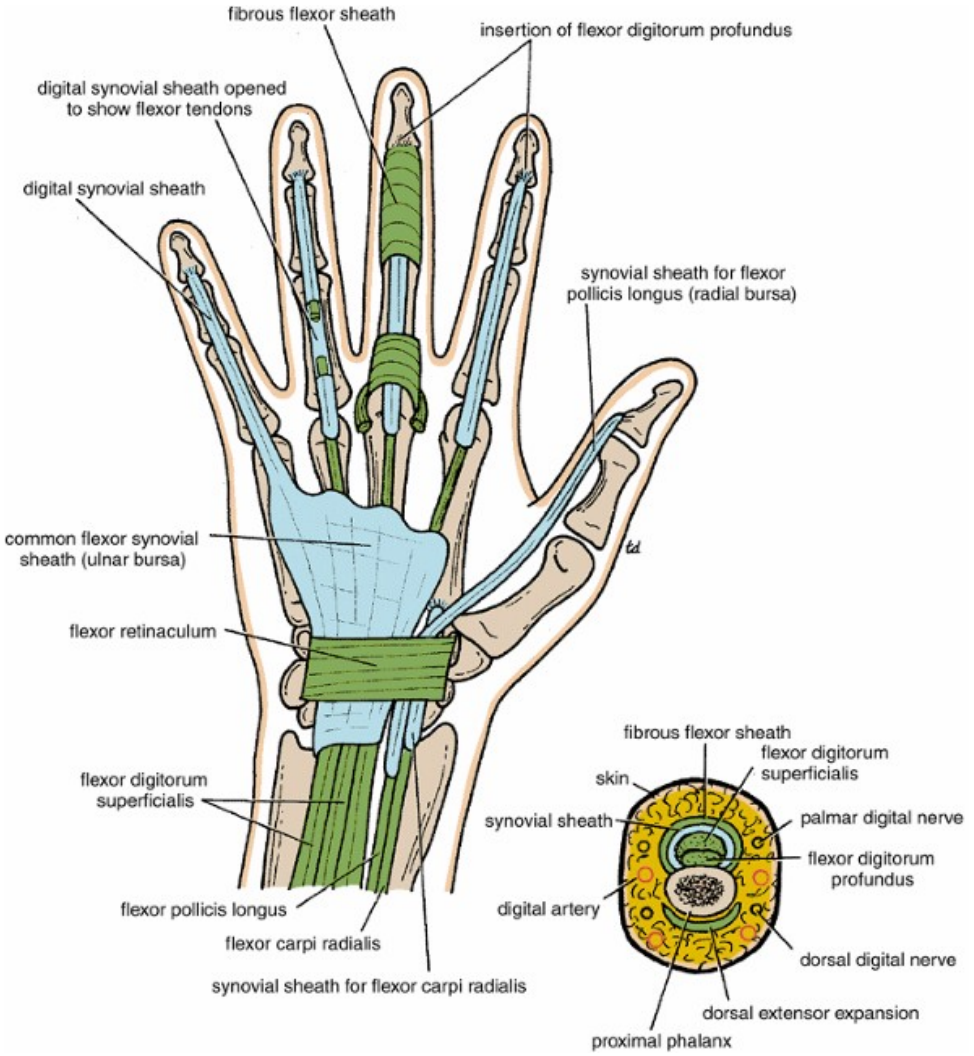
Synovial Sheaths of Flexor Tendons

- **Definition**:

These are **tubular sacs** which surround the terminal parts **of the tendons** before its insertion

- **Function:**

to provide a sort of **lubrication** for it.



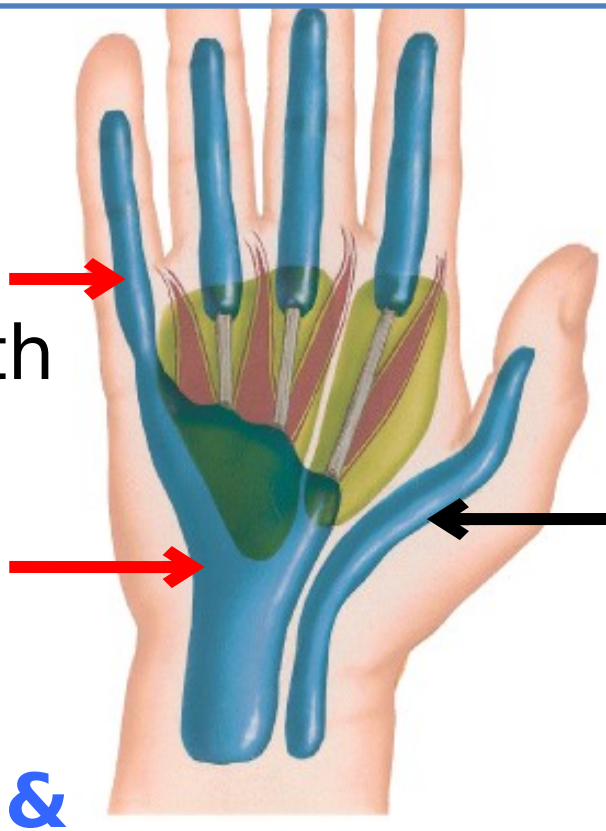
Synovial Sheaths of Flexor Tendons

There are 3 sheaths that surround the long flexors

1- Ulnar bursa:

This is a common synovial sheath for the 8 tendons of **flexor digitorum superficialis & profundus**.

It extends



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2- Radial bursa:

it surrounds tendon of **Flexor pollicis longus** and continues around the tendon till its

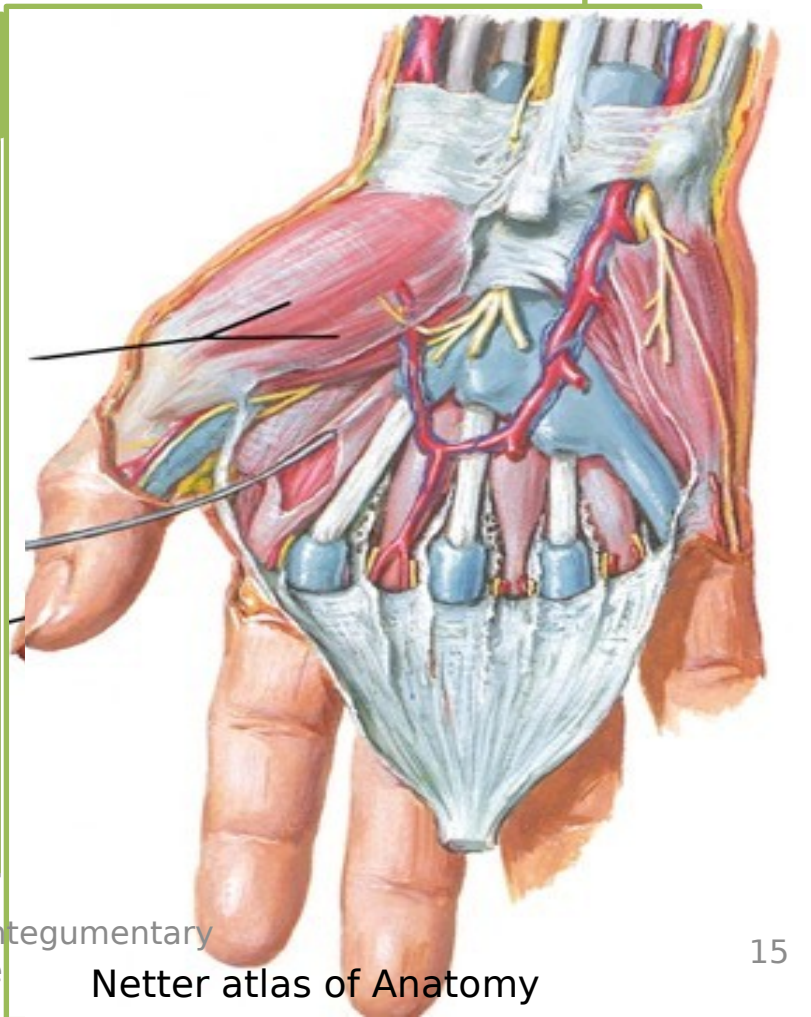
Palmar Aponeurosis

Definition: This is thick and strong fibrous sheet that covers the middle

** Function:

1- It is firmly attached to the overlying skin, so **it improves the gripping of the objects**.

2-Due to its toughness, it **protects the underlying structures**



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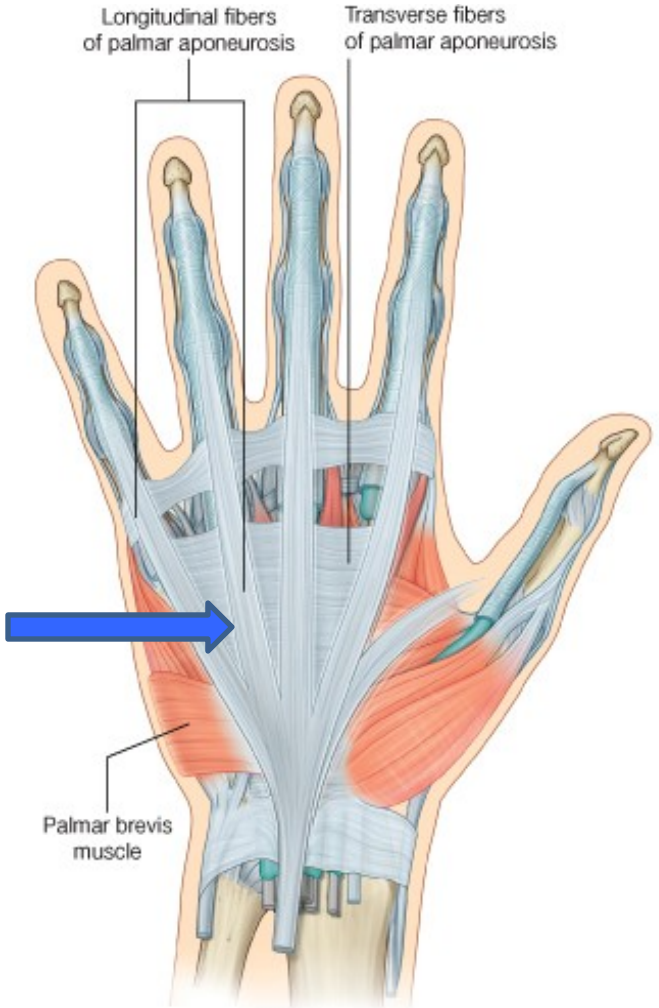
Palmar Aponeurosis

hape and attachments:

It is **triangular in shape** with its apex directed proximally and its base directed distally.

1- The apex: receives the insertion of Palmaris longus tendon.

2-The base: is divided



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Clinical Anatomy:

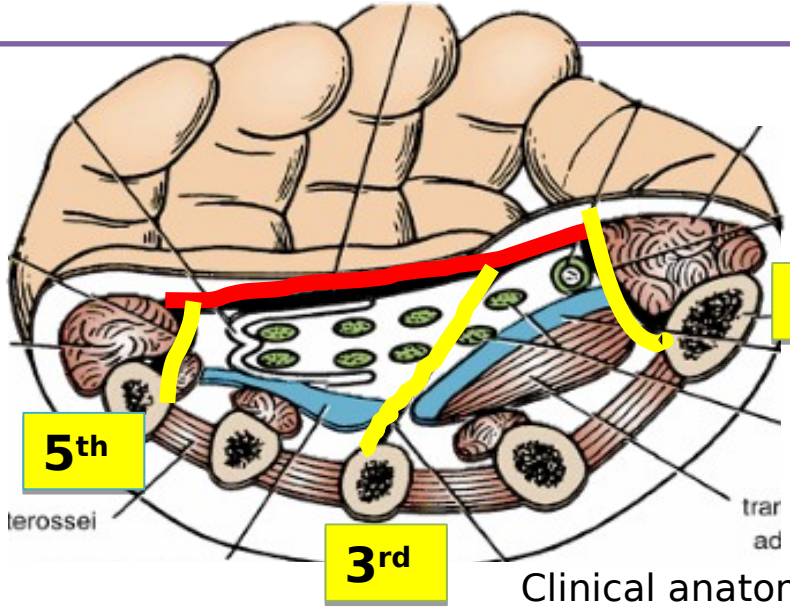
Dupuytren contracture of the hand

is a deformity in the hand in which the **medial part of the palmar aponeurosis** undergoes fibrosis producing progressive shortening and **flexion of the**

Fascial Compartments of Palm

Eac
septum into the depth of the palm divided It into facial
compartement

Medial compartment: contains hypothenar muscles

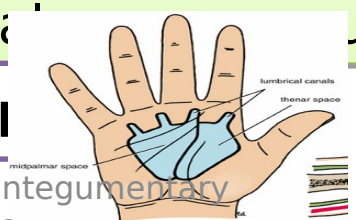


Lateral compartment: contains the thenar muscles

Clinical anatomy by region (Snell)

Intermediate compartment: deep to the pa urosis

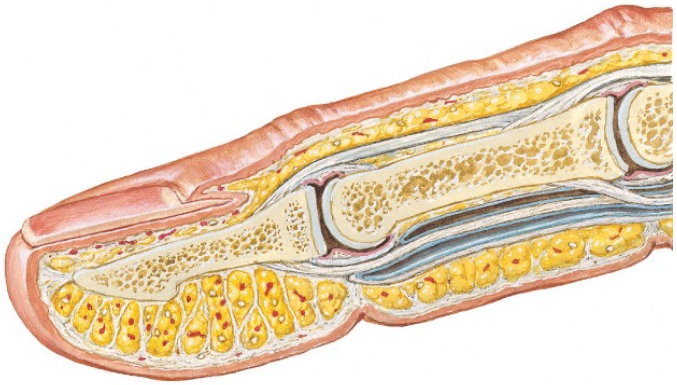
id-palmar compartme



thenar compartme

Pulp space:

* It is the space which lies over the palmar surface of the terminal (distal) phalanx, **It is** divided into separate loculi that contain subcutaneous fat.
Its infection is very painful due to accumulation of pus in narrow spaces under tension



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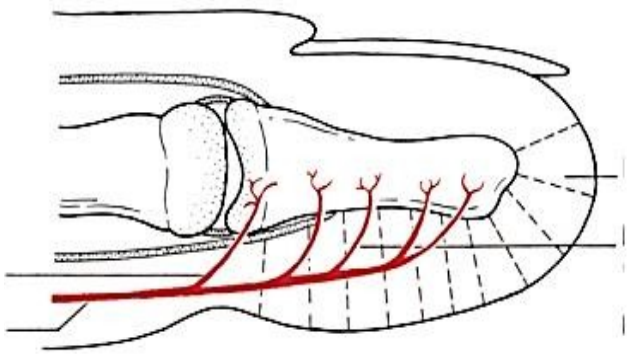


Muscles of the hand

■**Intrinsic muscles of the hand are 20 small muscles arranged in 3 groups:**

I. Lateral group short muscles of thumb

4

- **3 Thenar muscles**
- **Adductor pollicis deep to**

III. Central palm muscles [small muscles of fingers] 12

- **4 Lumbricals**
- **4 Palmar interossei**
- **4 Dorsal**

II. Medial group short muscles of little finger

4

- **3 Hypothenar muscles**
- **Palmaris**

ateral group [short muscles of thumb]

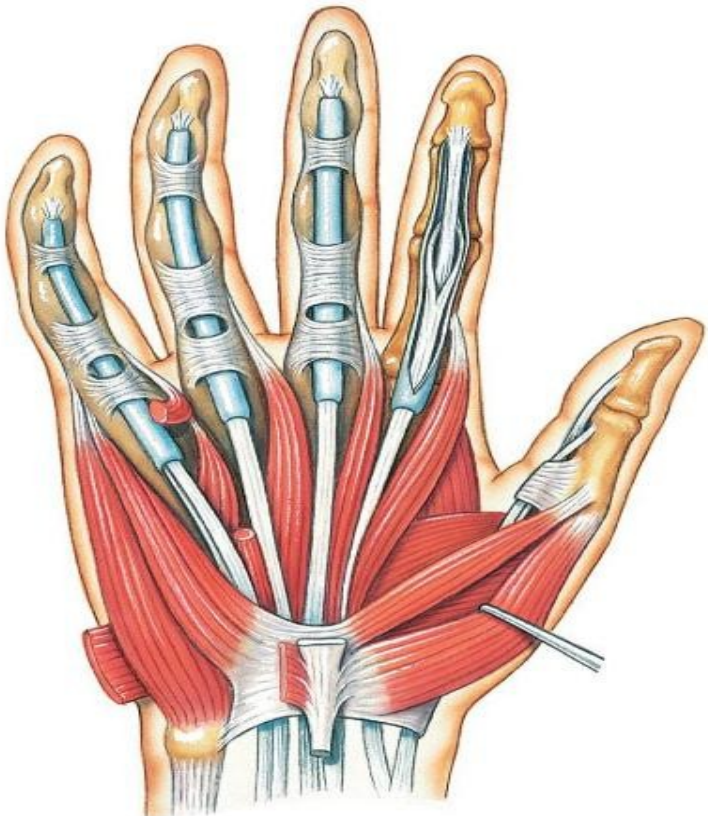
3 Thenar muscles

(form the thenar eminence)

1. **Abductor pollicis brevis.**
2. **Flexor pollicis brevis.**
3. **Opponens pollicis.**

1 Adductor pollicis

deep to them.



Lippincott Williams & Wilkins Atlas of Anatomy, 1st Edit

ateral group [short muscles of thumb]

- **Nerve supply:**

3 thenar Muscles ← **lateral terminal branch of Median Nerve.**

Adductor pollicis ← **deep terminal branch of Ulnar Nerve.**

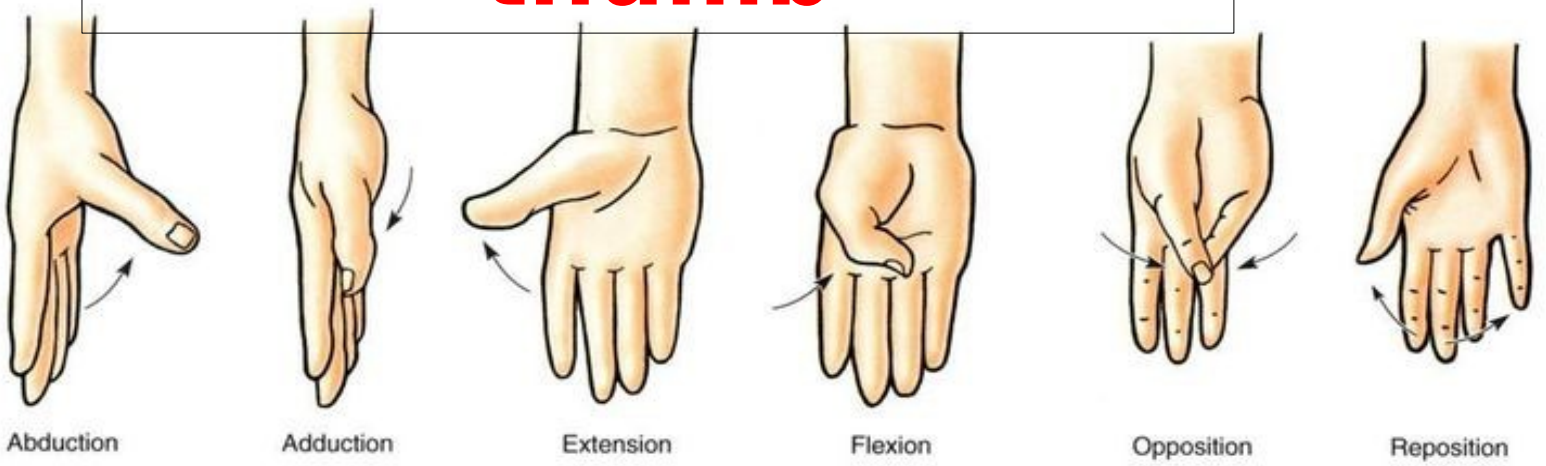
- **Action:**

.Abductor pollicis brevis ⇒ Abducts the thumb.

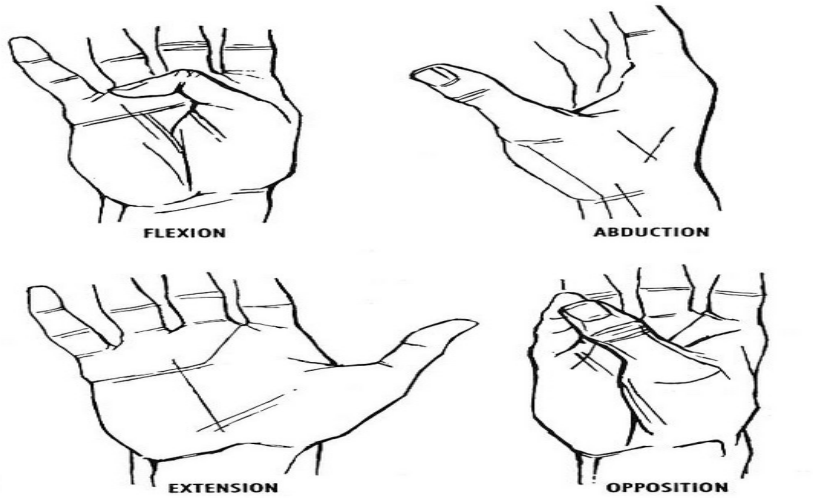
.Flexor pollicis brevis ⇒ Flexes the thumb.

.Opponens pollicis ⇒ Opposition of thumb (i.e. pulls the thumb medially & forward across the palm so the palmar surface of the tip of thumb comes in contact with the tips of other fingers) [opposition & counting fingers]. It is also used in

Movements of the thumb



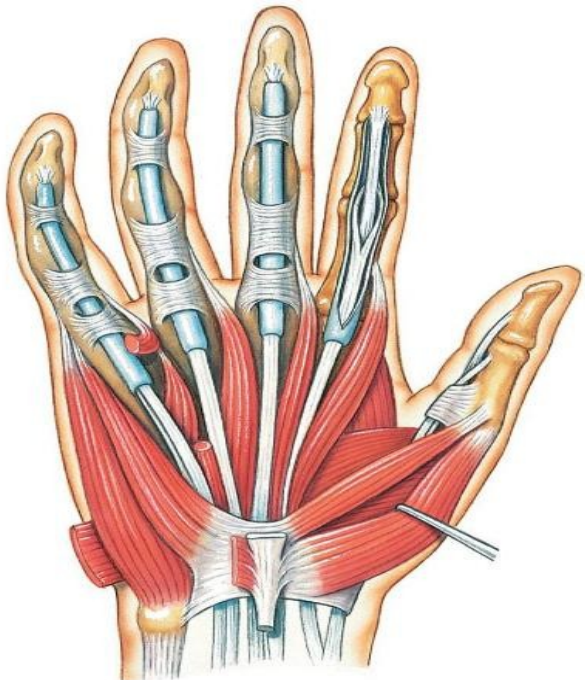
Clinical anatomy by region (Snell)



II.Medial group [short muscles of little finger

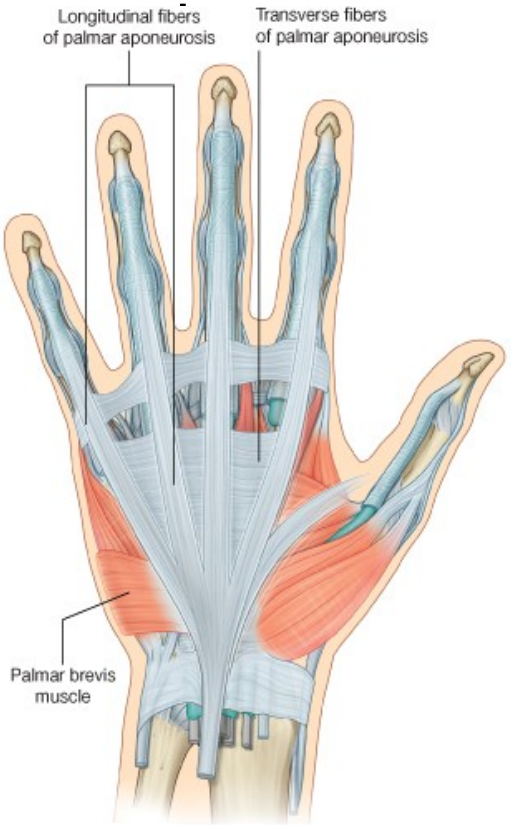
muscles :

1. **Abductor digiti minimi.**
2. **Flexor digiti minimi.**
3. **Oppo**
   minimi



1 Palmaris brevis

superficial to



Lippincott Williams & Wilkins Atlas of Anatomy, 1st Edition

Palmaris brevis

lies in superficial fascia, superficial to hypothenar Ms.

■It is thin sheet of subcutaneous muscle that covers the proximal part of hypothenar muscles.

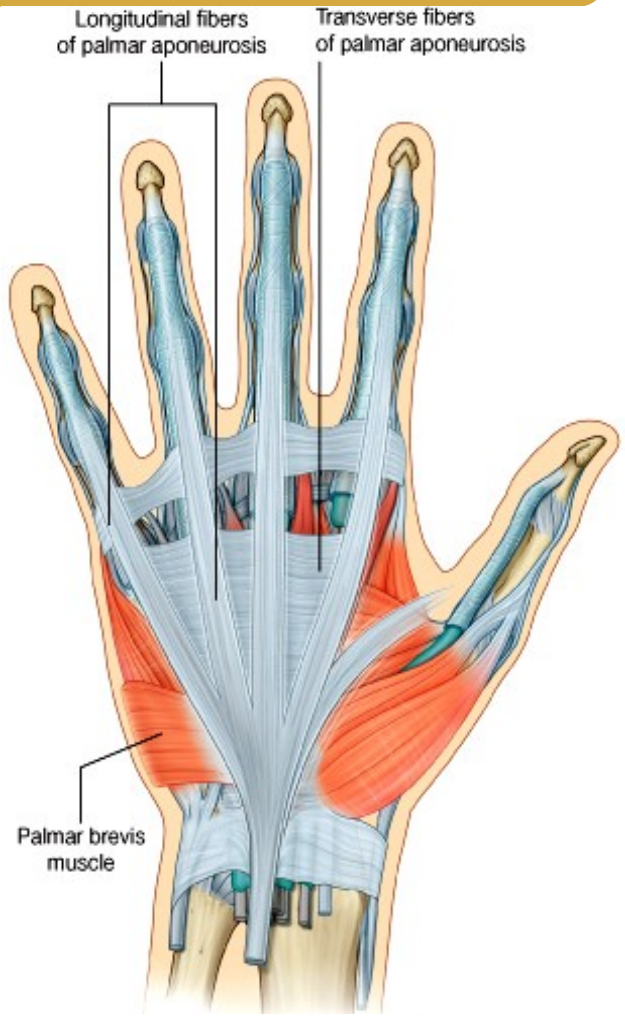
.**Origin**:

Medial margin of the palmar aponeurosis & flexor retinaculum.

.**Insertion**:

Skin of the medial (ulnar) border of the hand.

.**Action**: Deepen the hollow of



II. Medial group [short muscles of little finger

■**Nerve supply:**

3 hypothenar muscles deep terminal branch of ulnar nerve.

Palmaris brevis superficial terminal branch of ulnar nerve.

■**Action:**

.Abductor digiti minimi ⇒ Abducts the little finger.

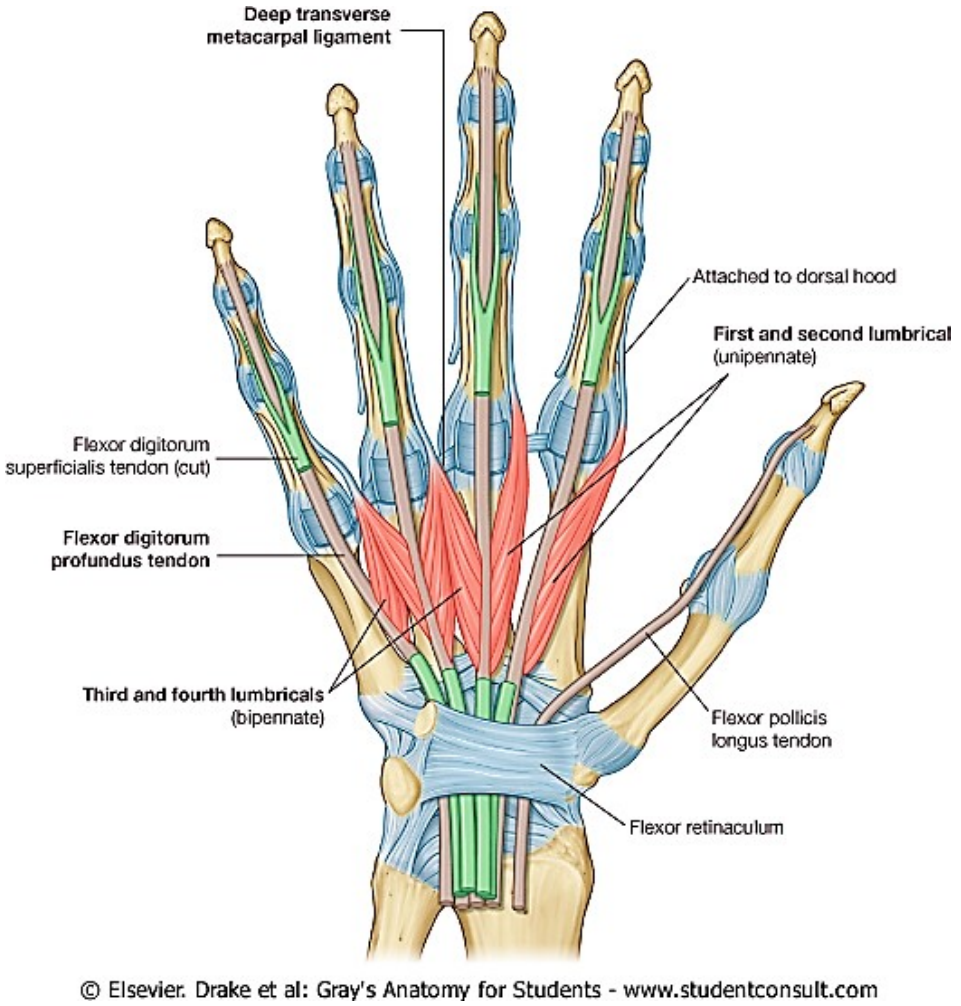
.Flexor digiti minimi ⇒ Flexes the little finger.

.Opponens digiti minimi = metacarpal bone forwards & l to deepen the hollow of gripping.

Clinical anatomy by region (Snell)

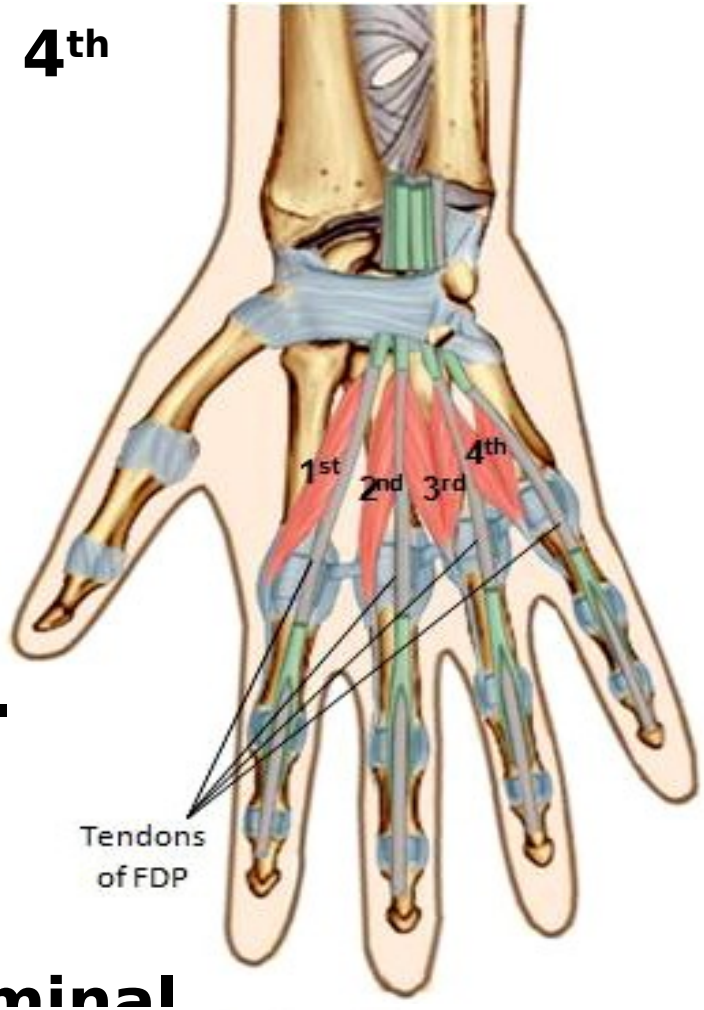
III.Central palm muscles [small muscles of fingers] 12

- 4 Lumbricals
- 4 Palmar interossei
- 4 Dorsal interossei.



Lumbrical muscles

- ✓ **4 small muscles arranged 1st – 4th from lateral to medial**
- ✓ **have No bony attachments.**
- ✓ **Origin: Tendons of Flexor Digitorum Profundus**



- **1st & 2nd lumbricals**
  - ➢ **Are unipennate.**
  - ➢ **are supplied by median nerve.**
- **3rd & 4th lumbricals**
  - ➢ **are bipennate.**
  - ➢ **are supplied by the deep terminal branch of ulnar nerve.**

umbrical muscles

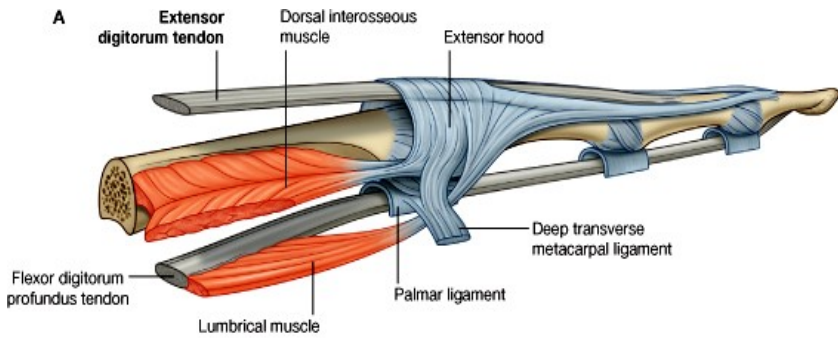
Insertion:

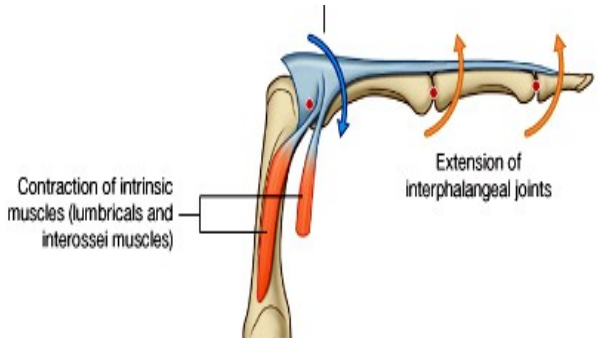
the lateral side of the extensor expansion of the corresponding finger [Medial 4 fingers].

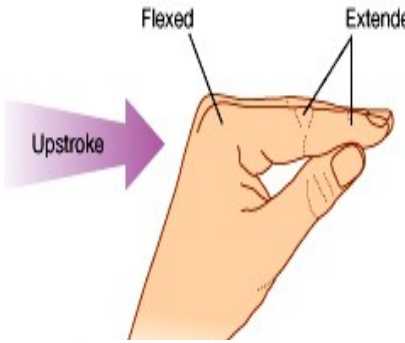
Action:

Together with interossei → **Put the fingers in writing position**

- Flex M-P joints
- extend I-P joints through the extensor

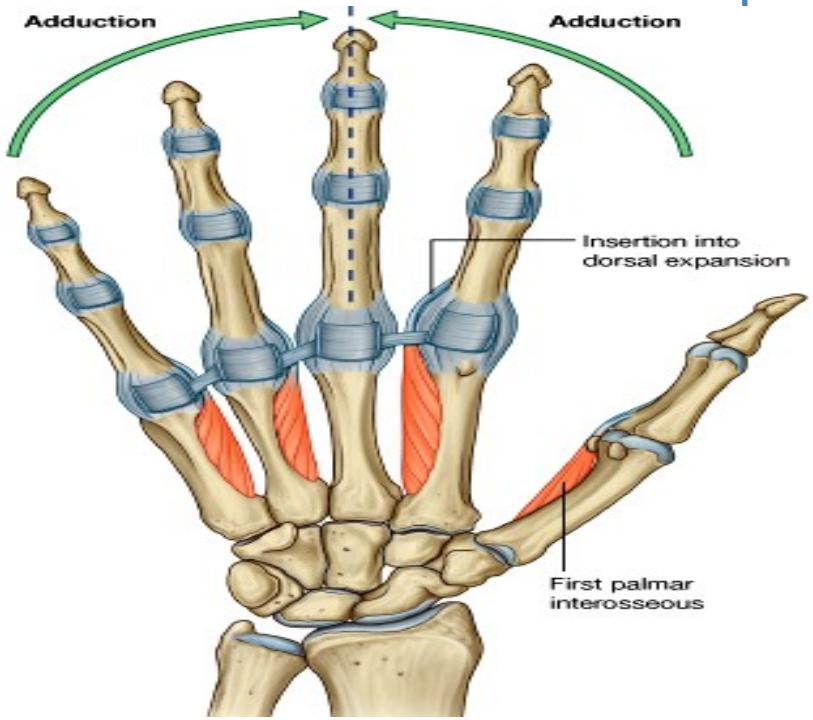




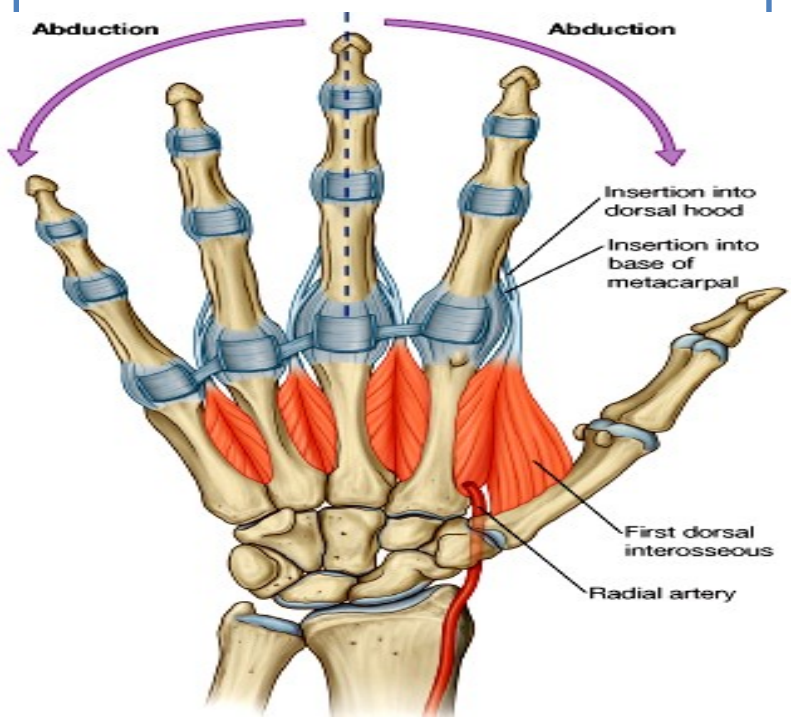


III.Central palm muscles [small muscles of fingers] 12

- **4 Palmar interossei**



- **4 Dorsal interossei.**



Palmar interossei (uni

Dorsal interossei (bi-pennat

❑ NERVE SUPPLY :

All the interossei Ulnar Nerve (deep terminal branch).

❑ ACTION:

1.Palmar interossei ADDUCT the fingers towards the axis of the middle finger (Pad).

2.Dorsal interossei ABDUCT the fingers from the axis of the middle finger (Dab).

3.Lumbricals & all interossei flex M-P joints & extend I-P joints ⇒ Put the fingers in the

●Notice that abduction & adduction of fingers are towards the **line of middle finger**.

EXTENSOR RETINACULUM

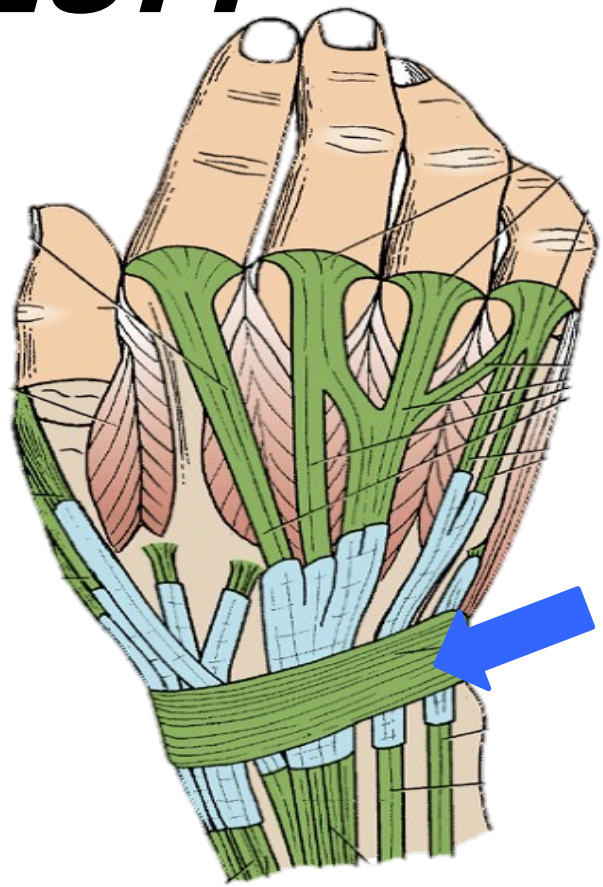
- ***Definition → it is fibrous band***
- ***Site → extend obliquely across the back of wrist.***
- ***Attachement →***

Medially :

pisiform & triquetral bones.

Laterally :

anterior border to lower



Clinical anatomy by region (Snell

EXTENSOR RETINACULUM

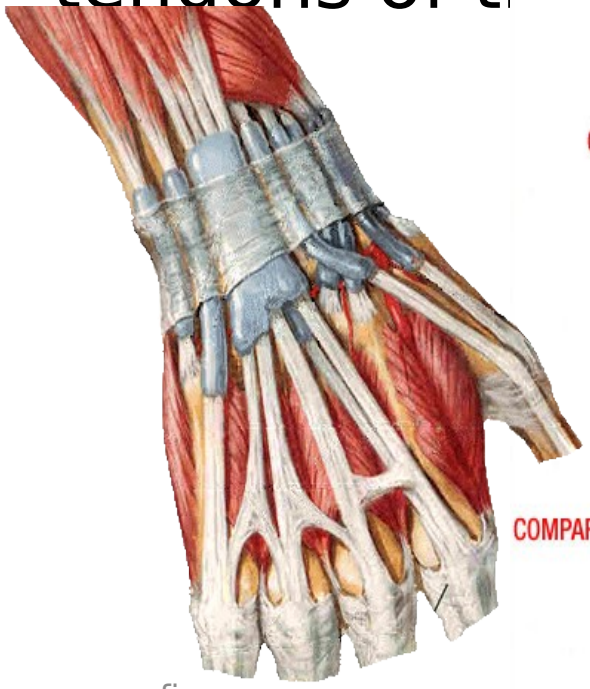
uctures superficial to the retinaculum:

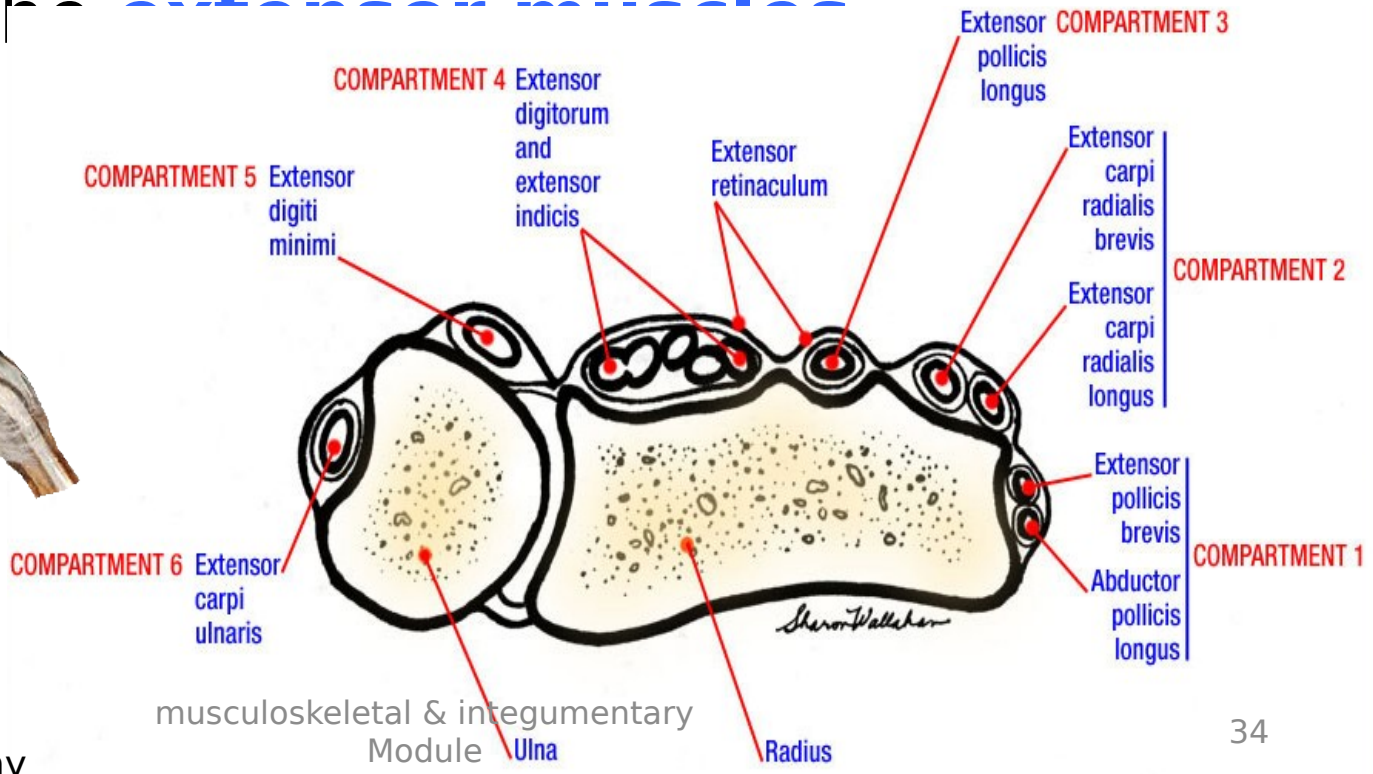
- ***1. The superficial terminal branch of the radial nerve. Laterally***
- ***2. Beginning of the cephalic vein.***
- ***3. Beginning of the basilic vein. Medially***
- ***4. The dorsal (cutaneous) branch of the ulnar nerve.***

EXTENSOR RETINACULUM

ructures deep to the retinaculum:

Beneath the extensor retinaculum, fibrous septa pass to the underlying radius and ulna and form **six compartments** that contain the tendons of th





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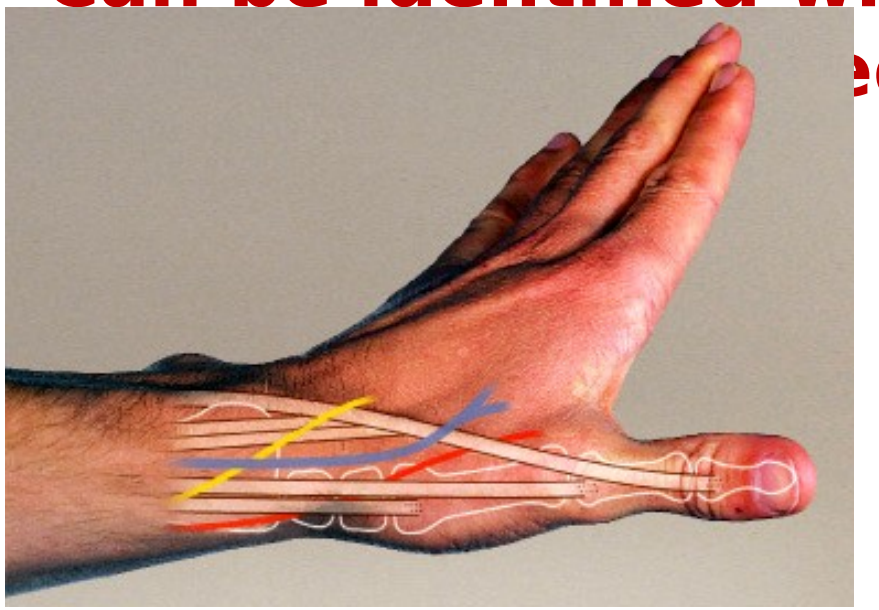
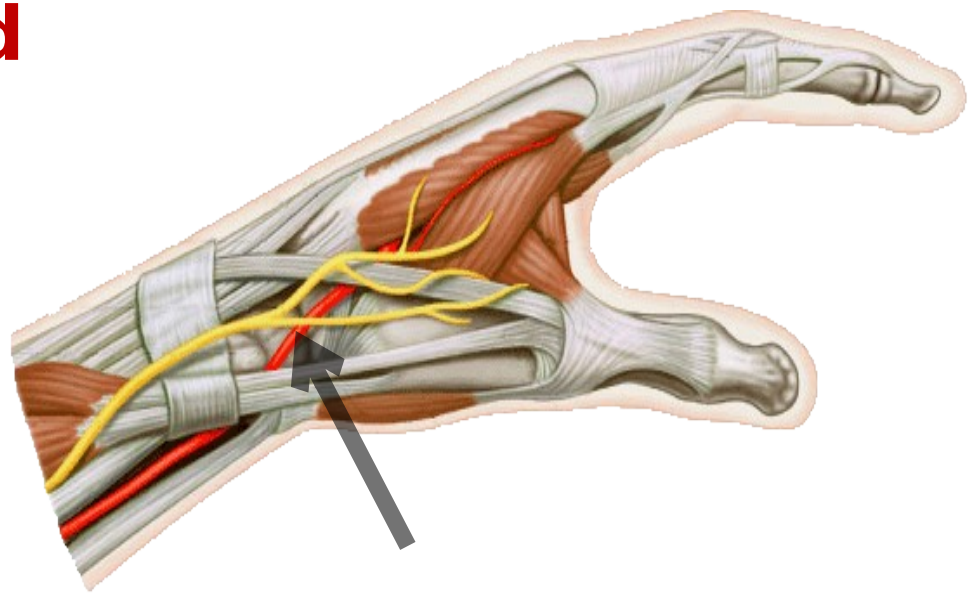
Anatomical “snuff box”

Position: It is a hollow on the lateral part of the wrist.

Can be identified when the thumb is
ed



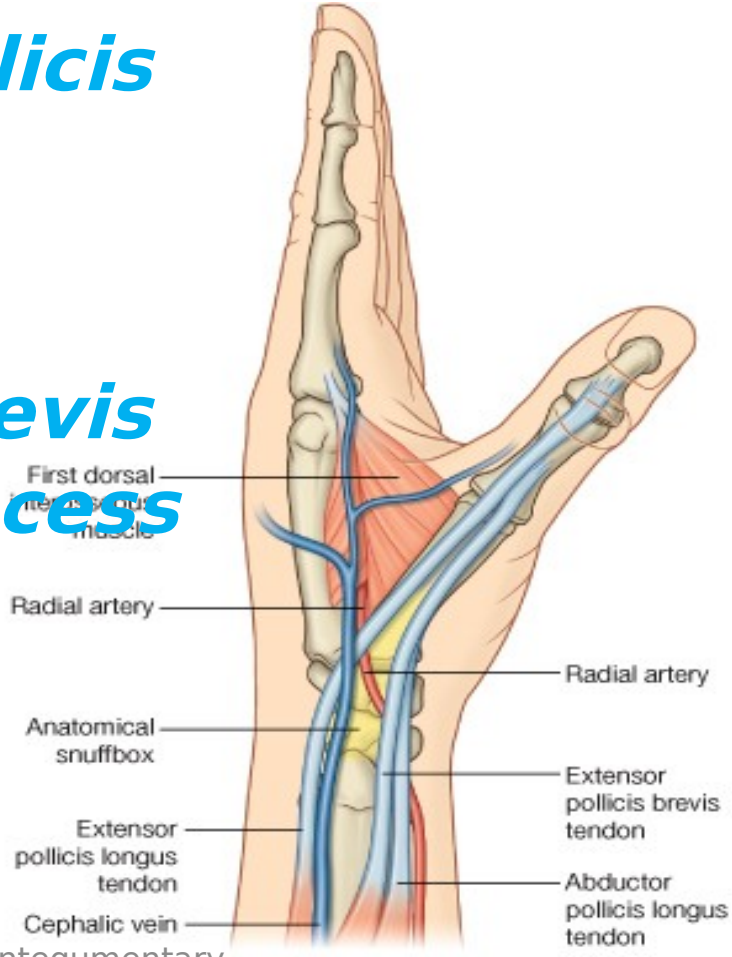


Radial artery crosses the floor of the snuff, so may fell the radial pulse in this fossa

Anatomical “snuff box”

Boundaries of Anatomical “snuff box”

- **Medial**: *extensor pollicis longs*
- **Lateral**: *abductor pollicis longus*
  extensor pollicis brevis
- **Proximal**: *styloid process of radius*
- **Floor**: *scaphoid*
  trapezium



Lecture Quiz

hich of the following lies deep to the flexor retinaculu

Palmar branch of the ulnar nerve
Median nerve
Ulnar vessels
Tendon of palmaris longus
Tendon of flexor carpi radialis

ar aponeurosis:

the degenerated distal part of palmaris longus muscle
loosely attached to the skin of the palm
es beneath the long flexor tendons
uadrangular in shape
s no role in formation of the fascial spaces in the pal

SUGGESTED TEXTBOOKS

Clinical Anatomy by Regions, 9th edition, 2011, Snell RS, Lippincott, Williams and Wilkins

Atlas of Human Anatomy, 6th edition, 2014, Netter F.H.

Gray's Anatomy for students, 2nd edition, 2011, Drake R. et al, Churchill & Livingstone